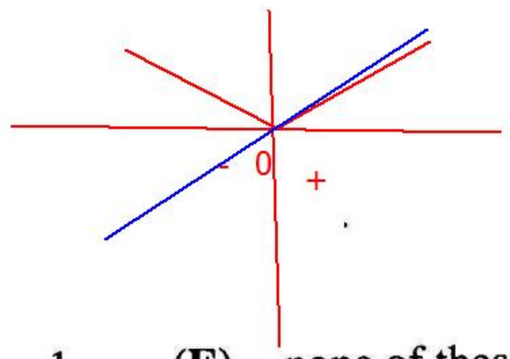
if x>0, IxI=x

but = -x when x<0



19. $\lim_{x\to 0}\frac{|x|}{x}$ is

(A) 0 **(B)** nonexistent **(C)** 1 **(D)** –1 **(E)** none of these

20. $\lim_{x\to\infty} x\sin\frac{1}{x}$ is

(A) 0 **(B)** ∞ **(C)** nonexistent **(D)** –1 **(E)** 1

Another Example

$\lim_{x\to 0}\frac{\sin 3x}{x} = \lim_{x\to 0}\frac{3\sin 3x}{3x}$

$= 3 * 1$

$= 3$

21. $\lim_{x\to\pi}\frac{\sin(\pi - x)}{\pi - x}$ is

$\lim_{x\to 0}\frac{\sin y}{y} = 1$ if x in radians — remember this!!!!

(A) 1 **(B)** 0 **(C)** ∞ **(D)** nonexistent **(E)** none of these

22. Let $f(x)=\begin{cases}\frac{x^2-1}{x-1} & \text{if } x\neq 1\\ 4 & \text{if } x=1.\end{cases}$

Which of the following statements is (are) true?

I. $\lim_{x\to 1} f(x)$ exists

II. $f(1)$ exists

III. f is continuous at $x = 1$

(A) I only **(B)** II only **(C)** I and II
(D) none of them **(E)** all of them

The function y=f(x) is continuous at x=c if

1) f(c) exists; (i.e. c is in the domain of f)

2) lim f(x) exists
x->c

3) lim f(x) = f(c)
x-->c

23. If $\begin{cases}f(x)=\frac{x^2-x}{2x} \text{ for } x\neq 0,\\ f(0)=k,\end{cases}$

and if f is continuous at $x = 0$, then $k =$

$\frac{x(x-1)}{2x} = \frac{(x-1)}{2}$ for all $x \neq 0$

(A) –1 **(B)** $-\frac{1}{2}$ **(C)** 0 **(D)** $\frac{1}{2}$. **(E)** 1

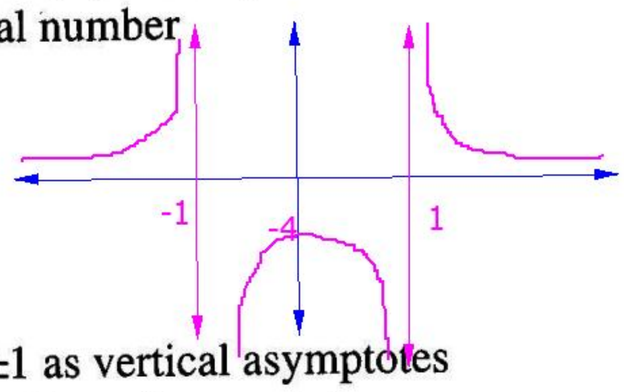
24. Suppose $\begin{cases}f(x)=\frac{3x(x-1)}{x^2-3x+2} \text{ for } x\neq 1, 2,\\ f(1)=-3,\\ f(2)=4.\end{cases}$

$\frac{3x(x-1)}{(x-1)(x-2)}$ $\frac{3x}{x-2}$

Then $f(x)$ is continuous

(A) except at $x = 1$ **(B)** except at $x = 2$ **(C)** except at $x = 1$ or 2
(D) except at $x = 0$, 1, or 2 **(E)** at each real number

25. The graph of $f(x)=\frac{4}{x^2-1}$ has $\frac{4}{(x-1)(x+1)}$



(A) one vertical asymptote, at $x = 1$
(B) the y-axis as vertical asymptote
(C) the x-axis as horizontal asymptote and $x = \pm 1$ as vertical asymptotes
(D) two vertical asymptotes, at $x = \pm 1$, but no horizontal asymptote
(E) no asymptote